

NOTE: The cover page of this standard has been changed for administrative reasons. There are no other changes to this document.

NOT MEASUREMENT
SENSITIVE

MIL-STD-162E
29 May 1980
SUPERSEDING
MIL-STD-162D
14 December 1972

DEPARTMENT OF DEFENSE STANDARD PRACTICE

**MATERIALS HANDLING EQUIPMENT: PREPARATION FOR
SHIPMENT, STORAGE, CYCLIC MAINTENANCE
ROUTINE TESTING AND PROCESSING**



AMSC N/A

AREA PACK

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

MIL-STD-162E
29 May 1980

DEPARTMENT OF DEFENSE

WASHINGTON, D.C. 20301

Materials Handling Equipment: Preparation for Shipment, Storage, Cyclic Maintenance
Routine Testing and Processing

MIL-STD-162E

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Recommended corrections, additions, or deletions should be addressed to:
U.S. Army Mobility Equipment Research and Development Command, ATTN: DRDME-DS,
Fort Belvoir, VA 22060.

CONTENTS

Paragraph		Page
1.	SCOPE	1
1.1	Purpose	1
1.2	Application	1
1.3	Classification	1
2.	REFERENCED DOCUMENTS	1
2.1	Issues of documents	1
2.2	Other publications	3
3.	DEFINITIONS	3
3.1	Preservation processing	3
3.2	Shipment	3
3.2.1	Mobile	3
3.3.2	Crated	4
3.3	Storage	4
3.3.1	Live storage	4
3.3.2	Dead storage	4
3.3.3	Controlled humidity storage	4
3.4	Basic issue items (BII)	4
3.5	Degrees of protection (preservation and packing)	4
3.5.1	Level A	4
3.5.2	Level B	4
3.5.3	Level C	4
3.5.4	Commercial	4
4.	GENERAL REQUIREMENTS	5
4.1	General	5
4.2	Disassemble	5
4.2.1	Overhead guards	5
4.3	Matchmarking	5
4.4	Cleaning and drying	5
4.5	Preservatives	5
4.6	Tape	5
4.7	Tags	5
4.8	Chassis lubrication	5
4.9	Basic issue items (BII)	6
4.9.1	Stowage of BII containers	6
4.10	Record forms	6
4.11	Instruction and operating manuals	6
4.12	Marking	6
4.13	Loading and shipment	6
4.13.1	Rail shipment	6
4.13.2	Highway shipment	6
4.13.3	Air shipment	7

Paragraph		Page
4.14	Painting	7
5.	DETAILED REQUIREMENTS	7
5.1	Level A	7
5.1.1	Engine and engine accessories	7
5.1.2	Load lifting and placement assembly	7
5.1.2.1	Hydraulic system	7
5.1.2.1.1	Hydraulic systems with oil returns	7
5.1.2.2	Mechanical systems	8
5.1.2.2.1	Gears	8
5.1.2.2.1.1	Exposed gears	8
5.1.2.2.1.2	Enclosed gears	8
5.1.2.2.2	Drive chains	8
5.1.2.2.2.1	Exposed chains, velocity joints and sprockets	8
5.1.2.2.2.2	Enclosed chains and chain housings	8
5.1.3	Winches and cables	8
5.1.4	Upright masts and booms	9
5.1.5	Rollers	9
5.1.6	Power train	9
5.1.6.1	Transmissions	9
5.1.6.1.1	Standard (synchromesh) drive	9
5.1.6.1.2	Automatic drive	9
5.1.6.1.3	Differentials transfer cases, and final drives	9
5.1.6.1.4	Drive shafts, propeller shafts, and universal joints	9
5.1.7	Drive belts	10
5.1.8	Batteries, cables and electrolyte	10
5.1.8.1	For internal combustion engines	10
5.1.8.2	For electric powered equipment	10
5.1.9	Brake systems	10
5.1.9.1	Brake drums	10
5.1.9.2	Hydraulic brakes	11
5.1.9.3	Electric brakes	11
5.1.9.4	Air-actuated brake systems	11
5.1.9.5	Air-hydraulic brakes	11
5.1.10	Disc-type clutches (dry type)	11
5.1.11	Operators compartment components	12
5.1.11.1	Gear shifts and control levers	12
5.1.11.2	Seat backs, arm rests, and cushions	12
5.1.11.3	Instrument panels	12
5.1.12	Pneumatic tires	12
5.1.13	Radiator fronts and windshields	12
5.1.13.1	Wiper arms and blades	12
5.1.14	Electric motors and electrical components	13

Paragraph		Page
5.1.14.1	Electric motors	13
5.1.14.2	Electrical components	13
5.1.15	Miscellaneous components	13
5.1.15.1	Operating levers	13
5.1.15.2	Lights, reflectors, and mirrors	13
5.1.16	Wheels, axles, and bearings	13
5.1.17	Power steering systems	13
5.1.18	Forks	13
5.1.19	Fire extinguishers	14
5.1.20	Maintenance tools	14
5.1.21	Repair parts	14
5.2	Level B	14
5.2.1	Engine and engine accessories	14
5.2.2	Hydraulic systems	14
5.2.3	Enclosed gears	14
5.2.4	Drive chains	15
5.2.4.1	Exposed chains, velocity joints and sprockets	15
5.2.4.2	Enclosed chains	15
5.2.5	Transmissions	15
5.2.6	Drive belts	15
5.2.7	Batteries, cables, and electrolyte	15
5.2.8	Brake systems	15
5.2.9	Pneumatic tires	15
5.2.10	Electric motors and electrical components	15
5.2.11	Operating levers	15
5.2.12	Power steering systems	15
5.2.13	Forks	15
5.2.14	Fire extinguishers	15
5.3	Level C	15
5.3.1	Internal combustion engines	15
5.3.3	Hydraulic systems and power train components	16
5.3.4	Maintenance tools and repair parts	16
5.3.5	Forks	16
5.3.6	Other components	16
5.3.6.1	Storage requirements for (CH) storage	16
5.4	Commercial	16
5.5	Packing for type I - mobile and type II - crated	16
5.5.1	Level A	16
5.5.1.1	Type I - mobile equipment	16
5.5.1.2	Type II - crated equipment	16
5.5.2	Level B	16
5.5.3	Commercial	17
5.6	Inspection criteria	17

APPENDIX A

	PREPARATION OF EQUIPMENT FOR LIVE STORAGE, CYCLIC MAINTENANCE, ROUTINE TESTING FOR PROCESSING	18
10.	SCOPE	18
10.1	Purpose	18
10.2	Scope	18
10.3	Classification	18
10.3.1	Mobile storage	18
20.	DETAILED REQUIREMENTS	18
20.1	Preparation for live storage	18
20.1.1	Fuel tanks	18
20.1.2	Covered openings	18
20.1.3	Preserved systems	18
20.2	Preparation for exercising	18
20.2.1	Major assemblies and mechanical systems	19
20.2.2	Tires	19
20.2.3	Fuel tanks	19
20.2.4	Batteries	19
20.3	Exercising	19
20.4	Cyclic maintenance, routine testing and processing	19
20.4.1	Inspection and maintenance after placement in live storage	19
20.4.2	Thirty-Day testing	19
30.	INSPECTION OF OPERATING CONDITIONS	20
30.1	Mobile equipment	20
30.2	Maintenance of records	20
30.3	Represervation	21

Paragraph		Page
-----------	--	------

APPENDIX B

	INSPECTION OF PROCESSING ACCOMPLISHED IN ACCORDANCE WITH THIS STANDARD	22
10.	SCOPE	22
10.1	Purpose	22
10.2	Scope	22
10.3	Classification	22
20.	DETAILED REQUIREMENTS	22
20.1	Responsibility for inspection	22
20.2	Material inspection.	22
20.3	Preproduction pack.	22
20.3.1	Examination	22
20.3.2	Test	22
30	QUALITY CONFORMANCE INSPECTION	23
30.1	Inspection stages	23
30.2	Unit of product.	23
30.3	Sampling	23
30.4	Examination.	23

TABLES

Table I	Inspection and maintenance (mobile only) (Appendix A)	20
Table II	Classification of defects (Appendix B)	23

FIGURES

Figures		
1.	Typical Application of metal strapping securing forks to trucks	29
2.	Claming device for fork securement on MHE	30
3.	Typical application of metal clamps securing forks to trucks	31

1. SCOPE

1.1 Purpose. This standard establishes the minimum requirements for level A, level B, level C, and Commercial preservation, packing and marking of self-propelled materials handling equipment for shipment from contractors or for storage at, or shipment from Government installations. Appendix A to this standard provides procedures to be effected at storage installations to maintain the equipment in operating condition while in live storage for an indefinite period. Appendix B to this standard provides inspection and test procedures to be effected by contractors at time of shipment and for dead storage in accordance with the detailed requirements of this standard. Appendix A and Appendix B are mandatory for use and form an integral part of this standard.

1.2 Application. The requirements contained in this standard are intended for application to materials handling equipment, such as forklift trucks, warehouse tractors, cranes (except construction type cranes and crane shovels 1/), gantry type or straddle type carrying trucks, pallet type and platform trucks, whether prepared for shipment at the point of manufacture or for shipment and storage at a Government installation. At the option of the using activity, this standard may be used as a guide for preservation, packing, and marking of other similar wheeled materials handling vehicles.

1.3 Classification. Preservation and packing shall be one of the following preparation types, as specified:

- Type I - Mobile. Preparation of the equipment, for shipment and storage, capable of being transported on the equipment wheels.
- Type II - Crated. Preparation of equipment, for shipment and storage that is to be transported in crates.

2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids, or request for proposal, and for use by storage installations, form a part of this standard to the extent specified herein:

1/ Note. Construction type cranes and crane shovels shall be prepared for shipment and storage in accordance with MIL-C-3580.

SPECIFICATIONS

FEDERAL

- | | |
|----------|---|
| L-P-378 | - Plastic Sheet and Strip, Thin Gauge, Polyolefin. |
| QQ-S-781 | - Strapping, Steel and Seals. |
| TT-P-664 | - Primer, Coating, Synthetic, Rust-Inhibiting, Lacquer-Resisting. |
| UU-T-81 | - Tags, Shipping and Stock. |

MIL-STD-162E

29 May 1980

- | | |
|------------|---|
| PPP-B-601 | - Boxes, Wood, Cleated-Plywood. |
| PPP-B-621 | - Boxes, Wood, Nailed and Lock-Corner. |
| PPP-B-636 | - Boxes, Shipping, Fiberboard. |
| PPP-B-1055 | - Barrier Material, Waterproofed, Flexible. |
| PPP-P-40 | - Packaging and Packing of Hand Tools. |

MILITARY

- | | |
|-------------|--|
| MIL-C-104 | - Crates, Wood; Lumber and Plywood Sheathed, Nailed, and Bolted. |
| MIL-P-116 | - Preservation-Packaging, Methods of. |
| MIL-B-121 | - Barrier Material, Greaseproofed, Waterproofed, Flexible. |
| MIL-S-207 | - Sulfuric Acid, electrolyte: Packaging, Packing and Marking for Shipment and Storage of. |
| MIL-L-2105 | - Lubricating Oil, Gear, Multi-Purpose. |
| MIL-C-3580 | - Cranes and Crane-Shovels, Truck, Crawler, and Wheel Mounted, Full Revolving and Their Attachments, Packaging of. |
| MIL-E-10062 | - Engines: Preparation for Shipment and Storage of. |
| MIL-V-13811 | - Varnish, Waterproofing, Electrical Ignition. |
| MIL-E-16298 | - Electric Machines Having Rotating Parts and Associated Repair Parts: Packaging of. |
| MIL-L-21260 | - Lubricating Oil, Internal-Combustion Engine, Preservative and Break-In. |
| MIL-T-22085 | - Tape, Pressure-Sensitive Adhesive Preservative and Sealing. |
| MIL-B-46176 | - Brake Fluid, Silicone, Automotive All Weather, Operational and Preservative. |
| MIL-T-46755 | - Tires, Pneumatic and Tires, Semipneumatic: Installed on Vehicles, Preparation for Storage of. |

STANDARDS

FEDERAL

- | | |
|-------------|--|
| FED-STD-101 | - Preservation, Packaging, and Packing Materials: Test Procedures. |
|-------------|--|

MILITARY

- | | |
|--------------|--|
| MIL-STD-105 | - Sampling Procedures and Tables for Inspection by Attributes. |
| MIL-STD-129 | - Marking for Shipment and Storage. |
| MIL-STD-1186 | - Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods. |

MIL-STD-1188 - Commercial Packaging of Supplies and Equipment.

(Copies of specifications required by contractor and storage installations in connection with specific procurement and storage functions should be obtained either from the procuring activity, responsible storage activity, or as directed by the contracting officer, or the responsible storage activity.)

2.2 Other publications. The following documents, drawings form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids, or request for proposal, and for use by storage installations, shall apply.

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Association, Inc., Traffic Department, 1616 P Street, N.W. Washington, DC 20036).

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification.

(Application for copies of should be addressed to the Uniform Classification Committee, Tariff Publishing Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

3. DEFINITIONS

3.1 Preservation processing. Preservation processing includes all operation incident to preparing materials handling equipment for shipment and storage as follows:

- (a) Cleaning and drying (in accordance with MIL-P-116).
- (b) Drainage of lubricants, coolants, and fuel (when applicable).
- (c) Preservation of internal and external surfaces.
- (d) Cleaning, drying, preservation, packing, marking, and stowage of detached parts and of Basic Issue Items (BII) issued with the equipment.
- (e) Packing and marking for preparation for shipment and storage.

3.2 Shipment. Shipment refers to transfer of equipment by rail, highway, air, or ship transport media.

3.2.1 Mobile. The term mobile refers to materials handling equipment, processed for shipment and storage, which is capable of being moved or towed on the equipment wheels.

3.2.2 Crated. The term crated refers to materials handling equipment, processed for shipment and storage, and is packed in a crate.

3.3 Storage. Storage refers to placing or keeping the materials handling equipment in a warehouse, building, covered or open structure, or in an open outdoor area.

3.3.1 Live storage. Live storage refers to maintenance of materials handling equipment in ready-to-ship, ready-to-operate condition on short notice (see Appendix A).

3.3.2 Dead Storage. Dead storage refers to materials handling equipment, preserved and processed in accordance with this standard, and under controlled storage surveillance, that will require complete depreservation at the time of activation, or when issued for use (see Appendix B).

3.3.3 Controlled humidity storage. Controlled humidity storage (CH) refers to the storage of materials handling equipment, live or dead in a controlled atmospheric condition that is 50 percent or less relative humidity.

3.4 Basic issue item (BII). The basic issue items, referred to herein, includes handtools and other miscellaneous items specified to be furnished with the materials handling equipment.

3.5 Degrees of protection (preservation and packing). Degrees of protection are defined in terms of the amount of processing required to protect the equipment and BII items under stipulated known conditions. There is no direct relationship between degrees of protection and methods of procedures of preservation, and packing. Degrees of protection and their application are determined by conditions that the equipment may be expected to encounter during shipment, handling, and storage. Methods of preservation and packing procedures are determined by physical characteristics of the specific item to be protected. Conditions described in this definition should not be construed as either describing or limiting the application of a particular degree of protection.

3.5.1 Level A. The degree required for protection of material against the most severe conditions known or anticipated to be encountered during shipment, handling and storage.

3.5.2 Level B. The degree required for protection of material under known favorable conditions during shipment, handling and storage.

3.5.3 Level C. The degree required for protection of materials to the first receiving activity during shipment, handling, and limited tenure of storage.

3.5.4 Commercial. The methods and materials employed by the supplier to satisfy the requirements of the commercial distribution system.

4. GENERAL REQUIREMENTS

4.1 General. General requirements specified herein are applicable to all preservation, and packing levels A, B, and C as specified in this standard.

4.2 Disassembly. Disassembly of the material handling equipment shall be the minimum necessary to safeguard parts vulnerable to damage, pilferage, and loss, and to the removal of protruding parts that would otherwise increase cubage such as exhaust stacks, forks, tines, and accessories not within the confines of the basic equipment. However, disassembly shall be limited to those parts that can be removed and installed without the use of special tools and skilled personnel. Removed bolts, nuts, screws, pins and washers shall be coated with type P-1 preservative and then reinstalled in mating parts and secured to prevent their loss. At the option of the responsible activity, wheels may or may not be removed for type II crated equipment for shipment storage.

4.2.1 Overhead guards. Collapsible overhead guards shall be unassembled to the extent necessary to secure the guards in the transport position to realize minimum cube.

4.3 Matchmarking. Removed parts and mating parts on the equipment shall be matchmarked when necessary to facilitate reassembly. Removed parts and mating parts on the equipment shall be identified by tags (see 4.7).

4.4 Cleaning and drying. Exterior surfaces of the equipment and the interior surfaces of cabs and bodies shall be clean and free of dirt, dust, grease, or other contaminants. Surfaces to which a preservative is to be applied shall be cleaned and dried prior to application of the preservative compounds. Cleaning processes and drying procedures shall be in accordance with MIL-P-116, cleaning process C-1 and drying procedures D-1 through D-4.

4.5 Preservatives. Preservatives, specified herein, identified by "P" numbers shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

4.6 Tape. Tape for sealing of openings and securing of components and barrier material shall conform to MIL-T-22085, type II.

4.7 Tags. Tags used for matchmarking, identification, and warning marking shall conform to UU-T-81, type B, class 2. For type I - mobile equipment, tags not in protected location that are in contact with the elements shall have the printing thereon in waterproof ink.

4.8 Chassis lubrication. All grease fittings and the parts lubricated by the fittings shall be charged to capacity with a lubricant containing a rust inhibitor and having the capacity of retention in the fittings or on the parts when subjected to prolonged storage and high temperature conditions. The lubricants shall be in accordance with the equipment manufacturer's lubrication instruction. All operational mating surfaces of components such as levers, latches, control linkage, locking pins, shafts, and pedal linkage shall be coated with type P-2 or type P-9 preservative. Grease lubricated bearings and other lubricated parts, not provided with grease fittings, shall be coated with type P-11 preservative.

4.9 Basic issue items (BII). Basic issue items furnished with each unit of equipment (see 3.4) shall be preserved in accordance with the applicable requirements for PPP-P-40, level A, or in accordance with MIL-P-116, submethods as applicable and consolidated together in a BII container. BII containers shall conform to PPP-B-601, overseas type, style I, or PPP-B-621, class 1, style 4. Closure shall be in accordance with the applicable box specification. Strapping shall not be required. The size and number of the BII containers shall be determined by the available space for securing the containers to the equipment for type I - mobile equipment and by the available space within the crate to accommodate the container for type II - crated equipment.

4.9.1 Stowage of BII containers. BII containers for type I - mobile equipment shall be stowed inside the body, cab, or any other suitable location on the equipment that will not increase cubage or interfere with towing the equipment or lifting the equipment with slings. BII containers for type II - crated equipment shall be stowed as specified herein, except any available space within the crate may be utilized for stowage. Strapping used for securing the containers in place on the units or to the crate bases shall conform to QQ-S-781, class I, type I or IV, size 3/4 inch by .035 inch. Finish B strapping shall be used for type I - mobile equipment. Finish A strapping shall be used for type II - crated equipment. Straps shall be properly tensioned and sealed.

4.10 Record forms. One copy each of DA Form 2408 - Modification Work Order and Major Unit Assembly Replacement Record and two copies of DA Form 2258 - Preservation and Depreservation Guide for Vehicles and Equipment shall be completed. The copy of DA Form 2408 and one copy of DA Form 2258 shall be placed in a heat-sealed waterproof envelope and stowed in the dash compartment or securely attached to the steering wheel or operators control. One copy of the DA Form 2258 shall be placed in the equipment log book. Other forms may be used as designated by the responsible technical activity. NOTE: The responsible technical activity should arrange to furnish the required forms when requested by contractors or storage activities.

4.11 Instruction and operating manuals. Instructions and operating manuals for each item of material handling equipment shall be preserved together in accordance with MIL-P-116, method IC-1. The preserved manuals shall be placed in a BII container (see 4.9) with other BII items.

4.12 Marking. In addition to any special marking required by the responsible activity, packs, shipping containers, and mobile units of equipment shall be marked in accordance with MIL-STD-129 for level A, B, or C packaging and in accordance with MIL-STD-1188 for commercial packaging.

4.13 Loading and Shipment.

4.13.1 Rail shipment. Shipment of mobile equipment and of crated equipment shall be in accordance with Uniform Freight Classification rules.

4.13.2 Highway shipment. Shipment of mobile equipment and of crated equipment shall be in accordance with National Motor Freight Classification rules.

4.13.3 Air shipment. Shipment of mobile equipment and of crated equipment shall be in accordance with current Civil Aeronautics Board Regulations and current Military Regulations.

4.14 Painting. Painted surfaces on which the paint film has become damaged or defective shall be cleaned as specified in 4.4 and repainted using materials of the same quality and color as that originally used.

5. DETAILED REQUIREMENTS

5.1 Level A. Preservation for type I - mobile, and type II - crated equipment.

5.1.1 Engines and engine accessories. Gasoline engines, diesel, and multifuel engines, and engine accessories shall be preserved in accordance with MIL-E-10062, level A, preparation type I, method I, for type I - mobile processed equipment and preparation type II, method I, for type II - crated processed equipment, unless specified elsewhere. Brake air compressors shall be preserved at the time the engine fuel system is being preserved (see 5.1.9.4 and 5.1.9.5).

5.1.2 Loading lifting and placement assembly.

5.1.2.1 Hydraulic systems. The hydraulic fluid supply tanks shall be filled to the operating level with the hydraulic fluid recommended for operation. The pistons shall be retracted as far as practicable into the cylinders and secured. When the pistons cannot be fully retracted, the exposed portions of the piston rods (ramshafts) shall be coated with type P-11 preservation, and the coated surfaces wrapped or covered with barrier-material conforming to MILI-B-121, type I, grade A, class 2 extending the wrap approximately 2 inches on the ram cylinder. The wrap or cover shall be secured in place with tape (see 4.6). When the pistons can be fully retracted, any remaining unpainted surfaces of the piston rods (ramshafts) shall be coated with type P-1 preservative. Wrapping shall not be required. The hydraulic controls shall be secured in the neutral position, and exposed surfaces of rods preserved as specified for piston rods. Hose shall not be disconnected. A tag (see 4.7) shall be attached to the system controls indicating: "This hydraulic system is filled to the operating level with approved fluid required for operation. DO NOT DRAIN."

5.1.2.1.1 Hydraulic systems with oil returns. Hydraulic systems with oil-returns shall be filled with hydraulic fluid and operated as specified in 5.1.2.1. In addition, connect a temporary line - one end to the high pressure outlet of control valve and the other end to lower connection of oil return line tube. Remove air bleed screw at to of hoist and with engine running at idle, move control valve lever slowly to up position allowing hydraulic fluid from reservoirs to flow through the oil return line completely filling the lift cylinder above the piston. The air bleed screw shall then be replaced, the temporary line removed and the high pressure line and the oil return line connected in their proper positions. The void above the pistons in cylinders having

overflow hoses in place of air bleed screws should be filled in any practical manner which will give in effect the same result. Hydraulic systems so treated shall be clearly marked with the following additional information included on the tag marking specified in 5.1.2.1:

“DRAIN OIL FROM UPPER PART OF LIFT CYLINDER BY SLOWLY RAISING THE UPRIGHT ASSEMBLY SO THAT THE CYLINDER PISTON IS IN THE TOP MOST POSITION. THIS WILL ALLOW OIL TO RETURN TO THE OIL RESERVOIR BY OIL RETURN LINE.”

5.1.2.2 Mechanical systems.

5.1.2.2.1 Gears.

5.1.2.2.1.1 Exposed gears. Unpainted surfaces of exposed gears shall be coated with type P-1 preservative or with a thin film of primer conforming to TT-P-664.

5.1.2.2.1.2 Enclosed gears. Gears operating on lubricating oil (SAE 10, 30, or 50) shall have the housing filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade as applicable, and the housing and gear controls tagged (see 4.7) to indicate: “The preservative oil contained in this gear housing is suitable for operation until the first required lubricant change. Do not drain until the first required lubricant change.” Gears operating on gear lubricant (SAE 80 or 90) shall have the housing filled to the operating level with lubricant conforming to MIL-L-2105, grade as applicable, and the housings and gear controls tagged (see 4.7) to indicate: “The lubricant contained in this gear housing is suitable for operation until the first required lubricant change.” Gears not operating on lubricating oil (SAE 10, 30, 50, 80, or 90) shall have the housing filled to the operating level with the approved lubricant recommended for operation, and the housing and gear controls tagged (see 4.7) to indicate: “The lubricant contained in this gear housing is operational lubricant. Do not drain until the first required lubricant change.”

5.1.2.2.2 Drive chains.

5.1.2.2.2.1 Exposed chains, velocity joints, and sprockets. Exposed drive chains and velocity joints shall be coated with enough type P-3 or type P-9 preservative to insure penetration of the preservative to the inner surfaces of the rollers, pins, and bushings. After the excess type P-3 or P-9 preservative has drained, the entire chain and the unpainted surfaces of the sprockets shall be coated with type P-1 preservative.

5.1.2.2.2.2 Enclosed chains and chain housings. Enclosed drive chains and chain housings shall be preserved and tagged as specified in 5.1.2.2.1.2 for enclosed gears and gear housings.

5.1.3 Winches and cables. Exposed gears shall be preserved as specified in 5.1.2.2.1.1. Enclosed gears and gear housings shall be preserved and tagged as specified in 5.1.2.2.1.2. Wire

cable, if not galvanized, shall be completely unwound from the drums and all surfaces coated with type P-1 preservative and rewound in the drums. Exposed, unpainted, and untreated metal surfaces of cable drums, cable sheaves, snatch blocks and linkage shall be coated with type P-1 preservative.

5.1.4 Upright masts and booms. Exposed unpainted metal surfaces of masts and booms shall be coated with type P-1 preservative. Telescoping masts and booms shall be extended full length. Moving mated parts shall be coated with type P-11 preservative and the masts and booms retracted to their minimum lengths and secured to prevent telescoping.

5.1.5 Rollers. All exterior unpainted exposed surfaces of rollers shall be coated with type P-1 preservative. If adequate coverage cannot be obtained, the rollers shall be sprayed with type P-7 preservative.

5.1.6 Power train.

5.1.6.1 Transmissions.

5.1.6.1.1 Standard (synchromesh) drive. The transmission shall be filled to the operating level with the applicable grade of lubricant conforming to MIL-L-2105. The transmission shall be operated through all ranges for a minimum of 1 minute at a sufficient engine speed to assure lubricant coverage of all interior parts and surfaces. A tag (see 4.7) shall be attached to the transmission control indicating: "The transmission housing is filled to the operating level with MIL-L-2105, applicable grade lubricant, and is good for operation until the first required lubricant change. Do not drain."

5.1.6.1.2 Automatic drive. Automatic drive transmission and torque converter housing shall be filled to the operating level with operational lubricant in accordance with the applicable lubrication order. The drive shall be operated as specified in 5.1.6.1.1. Seal openings into the housing with tape (see 4.6). A tag (see 4.7) shall be attached to the transmission operating control indicating: "This transmission housing is filled to the operating level with lubricant required for operation. Do not drain. Use until the first required lubricant change. Remove tape from openings."

5.1.6.1.3 Differentials, transfer cases, and final drives. Differential transfer cases, and final drives, except those lubricated by the unit to which they are attached, shall be preserved and tagged as specified in 5.1.2.2.1.2 for enclosed gears.

5.1.6.1.4 Drive shafts, propeller shafts, and universal joints. Unpainted surfaces of drive shafts, propeller shafts, and universal joints shall be coated with type P-1 preservative. Dust boots, if so equipped, shall be reinstalled after the preservative has dried. Steering knuckles shall be sprayed with type P-7 preservative.

5.1.7 Drive belts. Tension on all drive belts shall be released. Unpainted surfaces of pulley grooves shall be coated with a thin film of primer conforming to TT-P-664. A warning tag (see 4.7) shall be attached in a conspicuous location within the operators compartment indicating: "Belt tension on drive belts released. Adjust tension on all belts before operating the equipment."

5.1.8 Batteries, cables, and electrolyte.

5.1.8.1 For internal combustion engines. Battery cable shall be disconnected from the batteries and secured to the battery compartment with tape (see 4.6). The batteries shall be secured in place in the battery carrier. Battery terminal posts and cable terminals shall be coated with type P-11 preservative. The terminal posts and cable terminals shall be wrapped with barrier-material conforming to MIL-B-121, type I, grade A, class 2, and the barrier-material secured in place with tape (see 4.6). The vent openings into charged and dry batteries shall be sealed by placing a high density film (polyester tape or polyethylene film, 1 mil thickness) over the vent openings and the vent plugs turned or pushed into place over the film. The required amount of electrolyte, when furnished, shall be packed in accordance with MIL-S-207, type IV units. The packed electrolyte shall be stowed in a manner to permit easy removal when required by applicable maritime regulations or when shipment by air requires removal and special stowage.

5.1.8.2 For electric powered equipment. Battery cables shall be disconnected from the batteries and secured to the battery compartment as specified in 5.1.8.1. Battery posts and cable terminals shall be preserved and wrapped as specified in 5.1.8.1. Vent openings into charged and dry batteries shall be sealed as specified in 5.1.8.1. The batteries shall be secured in place on the equipment using flat strapping conforming to QQ-S-781, class I, type I or IV, finish B, size 5/8 inch by 0.020 inch. Wood blocks shall be positioned across the batteries under the strapping and shall bear on the battery cases only. The straps shall be properly tensioned and sealed using style I seals. Straps shall be stapled to the wood blocks. Electrolyte, when furnished, shall be packed, and stowed as specified in 5.1.8.1.

5.1.9 Brake system. Exterior, unpainted, untreated, and threaded surfaces of cables, clevises, and linkages of service and parking brakes, requiring the application of a contact preservative in accordance with MIL-P-116, shall be coated with type P-1 preservative.

5.1.9.1 Brake drums. Except as specified herein, metal surfaces enclosed within brake drums (such as adjusting wedges, pins, eccentrics, cam levers, linkages, anchors, retracting springs) and the braking surface of the brake drums shall be sprayed with a continuous film of primer conforming to TT-P-664. The film shall be a minimum of 0.50 mil to a maximum of 0.75 mil thick as determined by elcometer. Primer material containing lumps of skin or that will not return to a homogenous mixture upon stirring shall not be used. The film shall be thoroughly dry prior to reinstalling the brake drums. A warning tag (see 4.7) shall be securely attached in a conspicuous location in the operators compartment, indicating: "Brake drums and components

preserved. Do not apply brakes when vehicle is being moved. Towing shall be accomplished by use of a rigid towbar or similar arrangement until this vehicle is issued to the user.” Note. Interior surfaces of brake drums shall not be preserved when the item of equipment design incorporates a planetary drive with the wheel brake assembly, and the surfaces are inaccessible by simply removing the brake drums.

5.1.9.2 Hydraulic brakes. The hydraulic brake system shall be filled to the operating level with preservative fluid conforming to MIL-B-46176 and the brakes actuated to insure coating of all interior parts of the system with the preservative fluid. A warning tag (see 4.7) shall be attached to the brake control indicating: “This brake system is filled with the approved fluid. Do not drain.”

5.1.9.3 Electric brakes. Interior surfaces of the brake drum shall be preserved in accordance with 5.1.9.1 and as specified herein. Openings and vents of electrical items shall be sealed with tape. A warning tag (see 4.7) indicating “Openings and vents sealed; remove tape before operating the unit”, shall be securely attached in a conspicuous location within the operators compartment.

5.1.9.4 Air-actuated brake system. Brake air compressors shall be preserved in accordance with MIL-E-10062. The brake systems shall be drained. Interior surfaces of the air supply tanks shall be fogged with type P-10, type I, grade 30 preservative and the excess preservative allowed to drain. Threads of openings and the fill and drainplug threads shall be coated with type P-10 preservative, and the plugs shall be reinstalled. Air line filters shall be drained and closed. The exhaust ports of relay emergency quick release, and relay valves shall be closed by inserting pipeplugs or by sealing the ports with tape (see 4.6). Tags (see 4.7) shall be attached to the brake controls and to the valves and service lines indicating: “Remove plugs or tape from the exhaust ports, quick release and relay valves prior to operating the brake system.”

5.1.9.5 Air-hydraulic brakes. Air-hydraulic brakes shall be preserved in accordance with 5.1.9, 5.1.9.1, 5.1.9.2, 5.1.9.3, and 5.1.9.4. To preserve the interior surfaces, the plugs shall be removed from housing and connectors and the type P-10, type I, grade 30 preservative sprayed through each opening. The plugs and hose shall be reinstalled and the brakes operated through two cycles. The plugs and hose shall again be removed and the interior surfaces again sprayed with the type P-10 preservatives. The plugs and hose shall again be reinstalled.

5.1.10 Disc-type clutches (dry-type). With the cover plates removed and the clutch engaged, all accessible metal interior components shall be coated with a thin film of primer, 0.50 mil maximum, conforming to TT-P-664. Clutch control mechanisms not enclosed shall be coated with type P-1 preservative. After being sprayed, spring-loaded-type clutches shall have the clutch pedal secured in a partially disengaged position to eliminate contact between the disc facings and the pressure plates. Snap-over-center and toggle-in type clutches shall be completely disengaged. Cover plates shall be reinstalled.

5.1.11 Operators compartment components.

5.1.11.1 Gear shifts and control levers. Unpainted metal surfaces of handles and levers shall be coated with type P-1 preservative. For type I - mobile processed equipment, composition and rubber hand grips (if not enclosed within a full cab) shall be removed when possible and preserved in accordance with MIL-P-116, method IC-1, and placed in the equipment toolbox or placed with the BII items in 4.9. The threaded surfaces exposed by removal of hand grips shall be coated with type P-1 preservative. If not equipped with a full cab, composition or rubber hand grips, if left in place for any reason, shall be wrapped with barrier-material conforming to PPP-B-1055, class E-2, and the wraps secured in place with tape (see 4.6).

5.1.11.2 Seat backs, arm rests, and cushions. Type I - mobile processed equipment, not equipped with a closed cab, shall have the seat backs, arm rests, and cushions that are removable removed and individually wrapped with barrier-material conforming to PPP-B-1055, class E-2 or wrapped with black polyethylene conforming to L-P-378 (6 mil). The barrier-material or plastic film shall be secured with tape (see 4.6). The removed items shall be packed in BII containers (see 4.9). Seat backs, arm rests, and cushions that are not removable for type I - mobile processed equipment shall be wrapped or covered in place with the barrier-material or plastic film specified herein and the wraps secured in place with tape (see 4.6). An opening of adequate size to permit drainage shall be made in the barrier-material or plastic at the underside of the seat backs, arm rests, or cushions.

5.1.11.3 Instrument panels. For type I - mobile processed units, all openings into equipment mounted on instrument panels shall be sealed with tape (see 4.6). In addition, for equipment not equipped with a vandal guard, the dial glasses of instruments mounted on the panels shall be individually protected, or the entire panel shall be protected with a fitted piece of 1/4-inch thick plywood secured in place with tape (see 4.6).

5.1.12 Pneumatic tires. Tires mounted on the wheels, not removed from the equipment, shall be inflated to 10 pounds above pressure value recommended for maximum load. Tires mounted on wheels (spares) and wheels removed from the equipment shall be inflated to two-thirds value of the recommended operating pressure. Note. Pneumatic tires not ozone treated, mounted on equipment to be stored in open areas or shed storage for a period to exceed 90 days shall have the tires protected with polyethylene bags in accordance with MIL-T-46755.

5.1.13 Radiator fronts and windshields. For type I mobile processed units, radiator cores, not protected by metal grilles, and windshield glass shall be protected with fitted pieces of 1/4-inch thick plywood extending the full width and height of the radiators and windshields. The plywood panels shall be secured in place with steel strapping conforming to QQ-S-781, class I, type I or IV, finish B, size 3/4-inch by 0.020 inches. Straps shall be properly tensioned and sealed.

5.1.13.1 Wiper arms and blades. For type I - mobile processed units windshield wiper arms and blades shall be removed and preserved in accordance with MIL-P-116, method IC-I. The

preserved wiper arms and blades shall be placed in the equipment toolbox, or when a toolbox is not furnished, the preserved wiper arms and blades shall be placed in a BII box (see 4.9).

5.1.14 Electric motors and electrical components.

5.1.14.1 Electric motors. Electric motors shall be preserved in accordance with MIL-E-16298, level A, using the alternative method, specified for assembled machines.

5.1.14.2 Electrical components. Seal openings into generators, starters, voltage regulators, and other electrical components with tape (see 4.6).

5.1.15 Miscellaneous components. All exterior unpainted surfaces of "A" frames, crane and derrick booms, steering assemblies, tie and adjusting rods, and any other unpainted surface requiring the application of a contact preservative in accordance with MIL-P-116, shall be coated with type P-1 preservative.

5.1.15.1 Operating levers. All operating levers shall be placed in neutral position. Lever openings on electrical powered equipment shall be sealed with tape (see 4.6).

5.1.15.2 Lights, reflectors, and mirrors. Lamps, reflectors, and rear vision mirrors, if removed, shall be individually preserved in boxes conforming to PPP-B-636, W5c or W6c. Box closure shall be in accordance with appendix to the box specification, method V. The preserved lamps shall be placed in a BII container (see 4.9) with other BII items. Lamps, reflectors, and mirrors on type I mobile equipment, if not removed, and located outside the cab, shall be covered with barrier-material conforming to MIL-B-121, type I, grade A, class 2. The barrier-material shall be secured in place with tape (see 4.6).

5.1.16 Wheels, axles, and bearings. When wheels and hubs are removed from axles, for type II-crated processing of equipment, the interior bearing surfaces of the hubs and the exterior bearing surface of the axles shall be coated with type P-11 preservative. The coated surfaces of the axles shall be wrapped with barrier-material conforming to MIL-B-121, type I, grade A, class 2, secured in place with tape (see 4.6). Openings into hubs shall be covered with the same type, grade, and class of barrier-material and secured with tape (see 4.6). Bearings removed shall be coated with type P-11 preservative and each bearing preserved in accordance with MIL-P-116, method IC-1. The preserved bearings shall be placed in one of the BII containers (see 4.9).

5.1.17 Power steering systems. Reservoirs for power assist steering systems shall be filled to the operating level with the approved fluid required for operation. A tag shall be attached to the equipment steering wheel or control indicating: "To prevent damage to the power steering, do not operate control without the engine running."

5.1.18 Forks. Unpainted surfaces of the forks shall be coated with type P-1 preservative. Forks that are not collapsible or that cannot be folded back into the equipment body shall be

detached and secured in a suitable location on the equipment in a manner not to damage the equipment, increase cubage, or interfere with lifting or towing the equipment. Detached forks shall be secured to the equipment with strapping conforming to QQ-S-781, class 1, type I, heavy duty, size 1-1/4 inch by 0.035 inch. Finish B strapping shall be used for type I - mobile equipment. Finish A strapping shall be used for type II - crated equipment. Typical application of strapping shall be as illustrated on figure 1. Metal clamps for securing the forks to the equipment may be used in lieu of flat steel strapping. Typical construction of the clamps is illustrated on figure 2. Application of the clamps is illustrated on figure 3. Two or more straps or clamps shall be used as required to prevent movement of the forks. Wood blocks or wood dunnage may be used as necessary in conjunction with the straps or clamps to prevent loosening. Flat steel straps shall be properly tensioned and sealed. Forks which cannot be secured to the equipment shall be packed in BII containers (see 4.9) and the containers stowed as specified in 4.9.1.

5.1.19 Fire extinguishers. Unpainted exterior surfaces of fire extinguishers, requiring the application of a contact preservative in accordance with MIL-P-116, shall be coated with type P-1 preservative. For type I - mobile equipment, each fire extinguisher shall be preserved in a box conforming to PPP-B-636, W6c, style RSC. Box closure shall be in accordance with the appendix to the box specification method V. The preserved fire extinguishers shall be placed with other items in a BII container (see 4.9). For type II - crated equipment, the fire extinguishers shall be secured in place on the equipment.

5.1.20 Maintenance tools. Maintenance tools shall be preserved in accordance with PPP-P-40, level A. The preserved tools shall be placed in one of the BII containers (see 4.9).

5.1.21 Repair parts. The preservation application criteria and applicable method(s) of preservation of MIL-P-116 shall be used to preserve the repair parts. The preserved repair parts shall be placed in one of the BII containers (see 4.9).

5.2 Level B. Preservation for type I - mobile, and type II - crated equipment.

5.2.1 Engine and engine accessories. Engine and engine accessories shall be preserved as specified in 5.1.1 for level A.

5.2.2 Hydraulic systems. Hydraulic systems shall be preserved as specified in 5.1.2.1 and 5.1.2.1.1 for level A.

5.2.3 Enclosed gears. Enclosed gear housings shall be filled to the operating level with the approved lubricant required for operation. The gears shall be actuated to insure coating of all interior surfaces with the lubricant. Tags (see 4.7) shall be attached to gear controls indicating "Gear housing is filled to the operating level with the approved lubricant and is good for operation until the first required lubricant change".

5.2.4 Drive chains.

5.2.4.1 Exposed chains, velocity joints, and sprockets. Exposed chains and velocity joints shall be coated with type P-3 or P-9 preservative. Unpainted surfaces of sprockets shall be coated with type P-1 preservative.

5.2.4.2 Enclosed chains. Enclosed chains shall be processed and tagged as specified in 5.2.3 for enclosed gears.

5.2.5 Transmissions. Transmissions shall be preserved and tagged as specified in 5.1.6.1.1 and 5.1.6.1.2 for level A.

5.2.6 Drive belts. Tension on drive belts shall be released. A warning tag (see 4.7) shall be attached in a conspicuous location in the operators compartment indicating: "Belt tension on drive belts released." Adjust tension on all belts before operating equipment.

5.2.7 Batteries, cables, and electrolyte. Batteries, cables, and electrolyte shall be processed as specified in 5.1.8.1 and 5.1.8.2 for level A.

5.2.8 Brake systems. Brake systems shall be processed as specified in 5.1.9 through 5.1.9.5 for level A.

5.2.9 Pneumatic tires. Pneumatic tires shall be processed as specified in 5.1.12 for level A.

5.2.10 Electric motors and electric components. Electric motors and electrical components shall be preserved as specified in 5.1.14.1 and 5.1.14.2 for level A.

5.2.11 Operating levers. All operating levers shall be placed in neutral position.

5.2.12 Power steering systems. Power steering systems shall be processed and tagged as specified in 5.1.17 for level A.

5.2.13 Forks. Forks shall be positioned and secured as specified in 5.1.18 for level A. Strapping need not be finish B.

5.2.14 Fire extinguishers. Fire extinguishers shall be secured in place, or preserved as applicable as specified in 5.1.19 for level A.

5.2.15 Maintenance tools and repair parts. Maintenance tools and repair parts shall be preserved as specified in 5.1.20 and 5.1.21 for level A.

5.3 Level C. Preservation for type I - mobile equipment.

5.3.1 Internal combustion engines. Unless otherwise specified the engine fuel system, combustion chambers, valves, and cooling system shall be preserved in accordance with MIL-E-10062, level A, method I, type I classification.

5.3.2 Batteries and electrolyte. Batteries and electrolyte shall be processed as specified in 5.1.8.1 and 5.1.8.2 for level A as applicable.

5.3.3 Hydraulic systems and power train components. Hydraulic systems and power train components shall be filled to operating level with lubricants required for operation and each system control tagged (see 4.7) to indicate: "The Systems are filled with operational lubricants."

5.3.4 Maintenance tools and repair parts. Maintenance tools and repair parts shall be preserved as specified in 5.1.20 and 5.1.21 for level A.

5.3.5 Forks. Forks shall be positioned and secured as specified in 5.2.13.

5.3.6 Other components. Other components shall be preserved in a manner to afford protection against deterioration and damage from the supplier to the initial destination for immediate use or for controlled (CH) storage. Power steering systems shall be tagged (see 4.7) to indicate "Do not use steering system without engine operating".

5.3.6.1 Storage requirements for (CH) storage.

- (a) The entire fuel system shall be drained.
- (b) The drainplug and fuel filler cap shall not be reinstalled.
- (c) Drain openings and filler pipe openings shall be screened to prevent entry of insects and miscellaneous materials.
- (d) The drainplug and filler cap shall be secured adjacent to the drain and filler openings.

5.4 Commercial. Preservation shall be in accordance with MIL-STD-1188. Containers required in MIL-STD-1188 shall apply only to the disassembled components or basic issue items or any other components requiring consolidation with these items for ease in handling and protection from pilferage.

5.5 Packing for type I - mobile equipment and type II - crated equipment.

5.5.1 Level A.

5.5.1.1 Type I - mobile equipment. The equipment shall be shipped unboxed. Equipment wheels shall be free to rotate. BII containers shall be positioned on the equipment in accordance with 4.9.1.

5.5.1.2 Type II - crated equipment. Each unit of equipment and the BII containers for each unit shall be packed together in a crate conforming to MIL-C-104, class 1, style a or b. Blocking, bracing, and anchoring of the equipment within the crate shall be in accordance with MIL-STD-1186. The crate shall be strapped in accordance with the crate specification. Strapping shall be zinc-coated.

5.5.2 Level B. The equipment shall be packed as specified in 5.5.1.1, unboxed, for level A.

5.5.3 Commercial. The equipment shall be packed in accordance with MIL-STD-1188. Containers required in MIL-STD-1188 shall apply only to the disassembled components, or basic issue items or any other components requiring consolidation with these items for ease in handling and protection from pilferage.

5.6 Inspection criteria. Inspection levels, acceptable quality levels, and basis for rejection shall be in accordance with Appendix B to this standard.

Custodians:

Army - ME
Navy - SA
Air Force - 99

Preparing activity:

Army - ME

(Project PACK-0603)

Review activity:

Army - SM

User activity:

Navy - MC

APPENDIX A

PREPARATION OF EQUIPMENT FOR LIVE STORAGE, CYCLIC MAINTENANCE, ROUTINE TESTING FOR PROCESSING

10. SCOPE

10.1 Purpose. This appendix provides procedures to be effected at Government installations to maintain the equipment in operating condition while stored in live storage for an indefinite time and is a mandatory part of this standard.

10.2 Scope. The requirements contained in this appendix establish procedures to assure that the materials handling equipment is maintained in ready-to-ship ready-to-operate condition for immediate issue on short notice (live storage).

10.3 Classification.

10.3.1 Mobile storage. Preparation of vehicles for live storage and cyclic maintenance, routing testing and processing.

20. DETAILED REQUIREMENTS

20.1 Preparation for live storage. Upon receipt at the Government installation and before placing in live storage, each vehicle will be carefully examined to determine completeness and condition. Each unit shall be checked carefully for loose connections, preservation, warning tags, shipping seals and any other indication of preservative in accordance with the level A or B requirements of 5.1 or 5.2 for dead storage which will require depreservation before operation or exercising. Units showing evidence of level A or B preservation shall be depreserved in accordance with 20.1.1, 20.1.2, and 20.1.3.

20.1.1 Fuel tanks. Fuel tank shall be partially filled with fuel and drained through the bottom drainplug.

20.1.2 Covered openings. All seals shall be removed from the starter, motor, generator, exhaust pipe, breather tubes, carburetor, vents, and all other covered openings.

20.1.3 Preserved systems. All major assemblies, mechanical systems, et cetera, such as crankcase, differential, gear cases, and transmission, if filled with other than normal operating lubricant, shall be drained and flushed with a good grade of flushing oil.

20.2 Preparation for exercising. After depreservation each unit shall be prepared for operation as specified in 20.2.1, 20.2.2, 20.2.3 and 20.2.4.

20.2.1 Major assemblies and mechanical systems. Lubricate to manufacturer's instructions except that preservatives of lubricants shall conform to Government specifications where applicable. Check oil level and add standard lubricants.

20.2.2 Tires. All tires shall be inflated to the specified operating pressure.

20.2.3 Fuel tanks. Fuel tank shall be preserved in accordance with 5.1.1. Disconnect fuel line at injector pump.

20.2.4 Batteries. Disconnect battery cables, clean and coat cable terminals with P-11 preservative. Tape ends of cables with tape and secure to battery carrier. Remove all batteries and store in battery room. Maintain all batteries in operating condition for reinstallation in vehicles when required.

20.3 Exercising. Following preparation for exercising, the unit shall be operated and given a complete and given a complete checkup. A small 2-gallon portable tank connected directly to the injector pump will be used during exercising tests. Using a portable battery, start the unit and warm it up until normal operating temperature has been reached. Operate all of its controls and mechanisms. Carefully observe the operation for proper functioning. Make needed adjustments and repairs. When all checks have been made and a satisfactory operating condition has been established, the unit will be placed in live storage and the maintenance exercising routine, specified in 20.4 will be followed to maintain in operating condition.

20.4 Cyclic maintenance, routine testing and processing.

20.4.1 Inspection and maintenance after placement in live storage. Each mechanism of each unit in live storage shall be inspected not less than once each 15 to 30 days (depending on local conditions, e.g., exposure to adverse weather conditions, exposure to particularly high humidity, and extreme temperatures. Upon completion of inspection, if deterioration of protection is evident, each mechanism shall be operated for a period of 10 to 15 minutes. During inspection the following items shall be examined and operated if required:

- (a) Leaks in radiator, oil and hydraulic systems (tighten when necessary).
- (b) Proper functioning of engine. If not running smoothly, check spark plugs, distributor points, valves and carburetor.
- (c) Movable parts such as boom, mast and lift mechanism where applicable. Prior to operation the forks shall be installed in operating condition.
- (d) Oil pressure, temperature gage, ammeter, voltage regulator, generator and starter.

20.4.2 Thirty day testing. In addition to the 15 or 30 day inspection and maintenance of 20.4.1, each piece of equipment shall be tested under full load every 30 days, at which time the hydraulic system, carburetor and fuel pumps shall be checked for leaks. For lift trucks, testing

will be accomplished with full rated load on forks. The vehicle will be maneuvered in all directions and in all gear ratios for a period of 10 to 15 minutes. After testing, adjust and repair when necessary.

30. INSPECTION OF OPERATING CONDITION

30.1 Mobile equipment. Every 180 days, each piece of equipment will be examined in accordance with table II to determine the general operating conditions of each vehicle. Adjust and repair when necessary.

30.2 Maintenance of records. The storing and shipping activity will maintain records showing the identity (type, make, model, size, serial and registration numbers), location, condition, servicing, processing and repairs performed for each piece of equipment. Record will indicate the condition of the item upon arrival, upon being placed in storage, upon examination at each exercising period, and upon removal from storage with dates, amount, and approximate cost of servicing performed. Records will consist of an administrative log to be maintained as an office record. In addition, a depreservation guide commonly used by the bureau or agency concerned shall be attached to the equipment in a conspicuous location showing the processing accomplished.

TABLE I. Inspection and maintenance (mobile only).

A. Materials Handling Equipment, Gasoline Powered	
Engine and oil cooling system	Lubrication
Adjust fan and generator belts.	Lubricate chassis thoroughly,
Clean fuel pump and carburetor	according to manufacturer's
strainers, if necessary	lubrication chart, if neces-
Electrical connections	sary. Check lubricant in
Inspect all electrical con-	rear axle and transmission
nections. (Make necessary	and bring to level, if
adjustments.)	necessary.
Chassis	Electrical systems
Check alinement.	Spray waterproofing varnish
Check steering.	conforming to MIL-V-13811
Check gear shifting mechanism.	on coils, distributors, gen-
Wheel and brakes	erators, spark plugs, starters,
Check brake linkage and tighten	voltage regulators and wiring.
hydraulic lines, if necessary	(Do not spray contacts or into
	commutator openings.)

TABLE I. Inspection and maintenance (mobile only). (Cont'd)

B. Materials Handling Equipment, Electric Powered	
1. Check all items listed under A above as applicable and in addition accomplish the following:	
<p>Controller and contractor assemblies.</p> <p>Blow out all dust and grit accumulations with clean dry compressed air. (Tighten all connections if necessary.)</p> <p>Clean tips on controller or contractor with clean cloth wet with dry cleaning solvent and wipe dry. Wipe tips with a thin film of vaseline.</p> <p>Check controller and contractor action to ensure proper adjustment in accordance with manufacturer's specifications.</p>	<p>Electric motors.</p> <p>Clean outside of motors. Blow out interior of motor with clean dry compressed air. Lubricate in accordance with manufacturer's instructions, if necessary.</p> <p>General.</p> <p>Inspect all electrical connections and wiring. (Make necessary adjustments.)</p> <p>Check seat safety limit switch.</p> <p>Check brake safety limit switch.</p>

30.3 Represervation. Upon completion of exercising, the equipment shall be preserved to the extent necessary to maintain the equipment in operating condition. For equipment to be returned to CH storage, preserve level C, for equipment to be placed in favorable storage (covered), preserve level B, and for equipment to be returned to open or shed storage, preserve level A.

APPENDIX B

INSPECTION OF PROCESSING ACCOMPLISHED IN ACCORDANCE WITH THIS STANDARD

10. SCOPE

10.1 Purpose. This appendix provides procedures to be effected during processing for shipment by contractors and at Government installations for storage when equipment is being prepared for dead storage in accordance with the detailed requirements of this standard.

10.2 Scope. The requirements contained in this appendix establish examination and test procedures to assure the integrity of the finished preservation, packing, and marking its capability to withstand shipment and to withstand storage in a deactivated condition for an indefinite period of time.

10.3 Classification. Shipment and dead storage of type I – mobile and type II – crated equipment, preparation for shipment and for storage, of equipment, in accordance with this standard that will require complete depreservation to activate the equipment.

20. DETAILED REQUIREMENTS

20.1 Responsibility for inspection. The contractor of the equipment or the responsible storage activity of the equipment or both are responsible for the performance of the inspection requirements specified herein.

20.2 Material inspection. The contractor of the equipment or the responsible storage activity of the equipment or both are responsible for insuring that all supplies and materials used are manufactured, examined and tested in accordance with referenced specifications and standards.

20.3 Preproduction pack. To enable Government inspectors at supply points and at Government storage activities to ascertain that the requirements of this standard have been followed the contractor of the storage activity shall furnish a preproduction pack to determine compliance with the processing procedures of this standard.

20.3.1 Examination. The preproduction pack of type I – mobile equipment and of type II - crated equipment shall be examined for the defects specified in 30.4, table II. Examination shall be three stages as specified in 30.1. Presence of one or more defects shall be cause for rejection of the pack. Defects shall be corrected and the pack re-examined for compliance.

20.3.2 Test. The preproduction pack of type II - crated equipment shall be subject to the guided-impact test (railroad-car) in Appendix A to MIL-STD-1186. The test car shall strike a string of five empty cars with draft gear extended and the brakes set, at a speed of not less than

10 miles and not more than 11 miles per hour. When facilities for the rail-car test are not available, the pack shall be subjected to the pendulum-impact test, method No. 5012, of FED-STD-101. Shifting of contents, any visible damage to the contents, loosening or breaking of anchoring, blocking or bracing within the shipping container shall be cause for rejection. Defects shall be corrected and the pack retested for compliance.

30. QUALITY CONFORMANCE INSPECTION

30.1 Inspection stages. Inspection shall be in three stages as follows:

- (a) The first stage shall include inspection of procedures, methods, materials, containers, and container marking of completely preserved equipment for type I - mobile and type II - crated shipment or storage.
- (b) The second stage shall include inspection of materials, marking, blocking, bracing, and anchoring or type II - crated equipment prior to closing and shipping containers.
- (c) The third stage shall include inspection of materials, closure, strapping, and marking of closed containers containing type II - crated equipment and securing of BII containers and final marking of type I - mobile equipment.

30.2 Unit of product. For the purpose of inspection a complete unit prepared for any applicable inspection stage shall be considered a unit of product.

30.3 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

30.4 Examination. Samples selected in accordance with 30.3 shall be examined for the defects marked "X" in table II acceptable quality level (AQL) shall be 2.5 percent defective. As an aid in interpreting the defects, the defects are referenced to specific paragraph numbers of this standard.

TABLE II. Classification of Defects.

No.	Defect	Level		
		A	B	C
101.	Materials, methods, or containers not as specified. Each incorrect material, method or container shall Constitute one defect (4.5, 4.6, 4.7, 4.9, 4.9.1, 4.10, 5.1, 5.2, 5.3, and 5.5 and Appendix A	X	X	X
102.	Disassembly not as specified (4.2).	X	X	X
103.	Overhead guards not secured in the transport position (see 4.2.1).	X	X	X
104.	Matchmarking not as specified (see 4.3).	X	X	X
105.	Cleaning and drying not as specified	X	X	X

TABLE II. Classification of Defects. (cont'd)

No.	Defect	Level		
		A	B	C
106.	Tags not printed with waterproof ink as specified (4.7).	X	X	X
107.	Chassis not lubricated as specified (4.8).	X	X	X
108.	Chassis components not lubricated and coated as specified (4.8).	X	X	X
109.	Basic issue items not preserved as specified (4.9).	X	X	X
110.	Stowage of BII containers not as specified (4.9.1).	X	X	X
111.	Record forms not prepared, preserved, and stowed as specified (4.10).	X	X	X
112.	Instruction and operating manuals not preserved as specified (4.11).	X	X	X
113.	Marking illegible, incomplete, incorrect or missing(4.12).	X	X	X
114.	Damaged paint not repaired as specified (4.14).	X	X	X
115.	Hydraulic systems not filled with fluid recommended for operation (5.1.2.1, 5.1.2.1.1, 5.2.2).	X	X	-
116.	Exposed portions of hydraulic ramshafts not coated with preservative and the coated surfaces not wrapped as specified (5.1.2.1, 5.2.2).	X	X	-
117.	Hydraulic control not preserved and not secured in neutral position as specified (5.1.2.1, 5.2.2, 5.3.3).	X	X	X
118.	Hydraulic systems not tagged as specified (5.1.2.1, 5.2.2).	X	X	-
119.	Hydraulic systems with oil returns not preserved as specified and the systems not tagged as specified (5.1.2.1.1, 5.2.2).	X	X	-
120.	Exposed gears not preserved as specified (5.1.2.2.1.1).	X	-	-
121.	Enclosed gears not preserved as specified (5.1.2.2.1.2, 5.2.3).	X	X	-
122.	Enclosed gear housing and controls not tagged as specified (5.1.2.2.1.2, 5.2.3).	X	X	-
123.	Exposed chains, velocity joints, and sprockets not preserved as specified (5.1.2.2.2.1, 5.2.4.1).	X	X	-
124.	Enclosed chains and chain housing not preserved as specified and the housings not tagged as specified (5.1.2.2.2.2, 5.2.4.2).	X	X	-
125.	Winches and winch components not preserved as specified (5.1.3).	X	-	-
126.	Metal surfaces of upright masts and booms not coated with preservatives as specified (5.1.4).	X	-	-
127.	Masts and booms not retracted as specified and not secured as specified (5.1.4).	X	-	-
128.	Rollers not coated or sprayed with preservatives as specified (5.1.5).	X	-	-

TABLE II. Classification of Defects. (cont'd)

No.	Defect	Level		
		A	B	C
129.	Standard drive transmissions not filled to the operating level with the lubricant and not operated as specified (5.1.6.1.1, 5.2.5, 5.3.3).	X	X	X
130.	Standard drive transmission controls not tagged as specified (5.1.6.1.1, 5.2.5, 5.3.3).	X	X	X
131.	Automatic drive transmissions not filled to the operating level with lubricant and not operated as specified (5.1.6.1.2, 5.2.5, 5.3.3).	X	X	X
132.	Openings into automatic drives not sealed with tape as specified (5.1.6.1.2, 5.2.5).	X	X	-
133.	Automatic transmission control not tagged as specified (5.1.6.1.2, 5.2.5, 5.3.3).	X	X	X
134.	Differentials, transfer cases, and final drives not preserved and not tagged as specified (5.1.6.1.3).	X	-	-
135.	Unpainted surfaces of drive shafts, propeller shafts, and universal joints not coated with preservative as specified (5.1.6.1.4).	X	-	-
136.	Dust boots not reinstalled after preservative has dried (5.1.6.1.4).	X	-	-
137.	Steering knuckles not sprayed with preservative as specified (5.1.6.1.4).	X	-	-
138.	Tension on drive belts not released (5.1.7, 5.2.6).	X	X	-
139.	Unpainted surfaces of pulley grooves not coated with primer as specified (5.1.7)	X	-	-
140.	Tag not attached as specified (5.1.7, 5.2.6).	X	X	-
141.	Battery cables not disconnected from batteries and the cables not secured as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
142.	Terminal posts and cable terminals of batteries not coated with preservative as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
143.	Coated terminal posts and cable terminals, not wrapped, and the wraps not secured as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
144.	Vent openings into charged and dry batteries not sealed as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
145.	Electrolyte, when furnished, not packed as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
146.	Electrolyte not stowed as specified (5.1.8.1, 5.1.8.2, 5.2.7, 5.3.2).	X	X	X
147.	Batteries for electric powered equipment not secured in place as specified (5.1.8.2, 5.2.7, 5.3.2).	X	X	X

TABLE II. Classification of Defects. (cont'd)

No.	Defect	Level		
		A	B	C
148.	Exterior of brake components not coated with preservative as specified (5.1.9, 5.2.8).	X	X	-
149.	Primer coating on brake drums not within specified limits (5.1.9.1, 5.2.8).	X	X	-
150.	Primer not thoroughly dry prior to reinstalling the brake drums (5.1.9.1, 5.2.8).	X	X	-
151.	Tag not attached as specified for preserved brake drums (5.1.9.1, 5.2.8).	X	X	-
152.	Hydraulic brakes not tagged as specified (5.1.9.1, 5.1.9.2, 5.2.8).	X	X	-
153.	Electric brakes not preserved as specified and openings not sealed as specified (5.1.9.3, 5.2.8).	X	X	-
154.	Electric brakes not tagged as specified (5.1.9.4, 5.2.8).	X	X	-
155.	Air-actuated brake air compressors not preserved as specified (5.1.9.4, 5.2.8).	X	X	-
156.	Air-actuated brake systems not drained as specified (5.1.9.4, 5.2.8).	X	X	-
157.	Interior of air tanks not preserved and the excess preservative not drained as specified (5.1.9.4, 5.2.8).	X	X	-
158.	Air line filters not drained and closed (5.1.9.4, 5.2.8).	X	X	-
159.	Exhaust ports of relay emergency, quick release, and relay valves not closed or sealed as specified (5.1.9.4, 5.2.8).	X	X	-
160.	Air-actuated brake systems not tagged as specified (5.1.9.4, 5.2.8).	X	X	-
161.	Air-hydraulic brakes not preserved as specified (5.1.9.5, 5.2.8).	X	X	-
162.	Plugs and hose not reinstalled and brakes not operated after preservation as specified (5.1.9.5, 5.2.8).	X	X	-
163.	Plugs and hose not again removed and the preservation repeated (5.1.9.5, 5.2.8).	X	X	-
164.	Plugs and hose not reinstalled upon completion of brake preservation (5.1.9.5, 5.2.8).	X	X	-
165.	Disc-type clutches not preserved as specified (5.1.10).	X	-	-
166.	Clutches not disengaged as specified (5.1.10).	X	-	-
167.	Clutch cover plates not reinstalled (5.1.10).	X	-	-
168.	Unpainted metal surfaces of gear shifts and levers not coated with preservative as specified (5.1.11.1).	X	-	-
169.	Composition and rubber handgrips not removed for type I equipment, if not enclosed within a full cab, when possible (5.1.11.1).	X	-	-

TABLE II. Classification of Defects. (cont'd)

No.	Defect	Level		
		A	B	C
170.	Grips not preserved and stowed as specified for type I equipment (5.1.11.1).	X	-	-
171.	Threaded surfaces where handgrips have been removed not coated with preservative as specified (5.1.11.1).	X	-	-
172.	Handgrips if not removed for type I equipment not wrapped and the wrap not secured with tape (5.1.11.1).	X	-	-
173.	Removable seat backs, arm rests, and cushions not removed, not wrapped, and not stowed as specified, for type I mobile (5.1.11.2).	X	-	-
174.	Seat backs, arm rests, and cushions, not removable for type I mobile, not wrapped or covered in place as specified (5.1.11.2).	X	-	-
175.	Drainage openings not provided in wraps as specified (5.1.11.2).	X	-	-
176.	Instrument panels on type I mobile equipment not protected as specified (5.1.11.3).	X	-	-
177.	Pneumatic tires not inflated or deflated as applicable (5.1.12, 5.2.7).	X	X	-
178.	Radiator fronts and windshields on type I - mobile equipment not protected as specified (5.1.13).	X	-	-
179.	Wiper arms and blade for type I - mobile equipment not removed, not preserved and not stowed as specified (5.1.13.1).	X	-	-
180.	Electrical components and electric motors not sealed as specified (5.1.14.1, 5.1.14.2, 5.2.10).	X	X	-
181.	Miscellaneous components not coated with preservative as specified (5.1.15).	X	-	-
182.	Operating levers not placed in neutral position (5.1.15.1, 5.2.11).	X	X	-
183.	Lever openings on electrical equipment not sealed as specified (5.1.15.1).	X	-	-
184.	Removed lights, reflectors, and mirrors not preserved as specified (5.1.15.2).	X	-	-
185.	Lamps, reflectors, and mirrors not located within a cab for type I - mobile equipment, if not removed, not covered and the cover not secured as specified (5.1.15.2).	X	X	X
186.	Interior bearing surfaces of hubs and exterior bearing surfaces of axles, when wheels are removed, not coated with preservatives as specified (5.1.16).	X	-	-

TABLE II. Classification of Defects. (cont'd)

No.	Defect	Level		
		A	B	C
187.	Preserved surfaces and hub openings not covered with barrier material and the barrier material not secured in place as specified (5.1.16).	X	-	-
188.	Wheel bearings, if removed, not preserved and not stowed as specified (5.1.16).	X	-	-
189.	Power steering systems not tagged as specified (5.1.17, 5.2.12, 5.3.6).	X	X	X
190.	Unpainted surfaces of forks not coated with preservative as specified (5.1.18).	X	-	-
191.	Forks not located and secured as specified (5.1.18, 5.2.13).	X	X	-
192.	Fire extinguishers not preserved or not secured as specified (5.1.19, 5.2.14).	X	X	-
193.	Maintenance tools and repair parts not placed in a BII container as specified (5.1.20, 5.1.21, 5.2.15, 5.3.4).	X	X	X
194.	Forks not left in operational position (5.3.5).	-	-	X
195.	Strapping not zinc-coated (5.5.1.2).	X	-	-

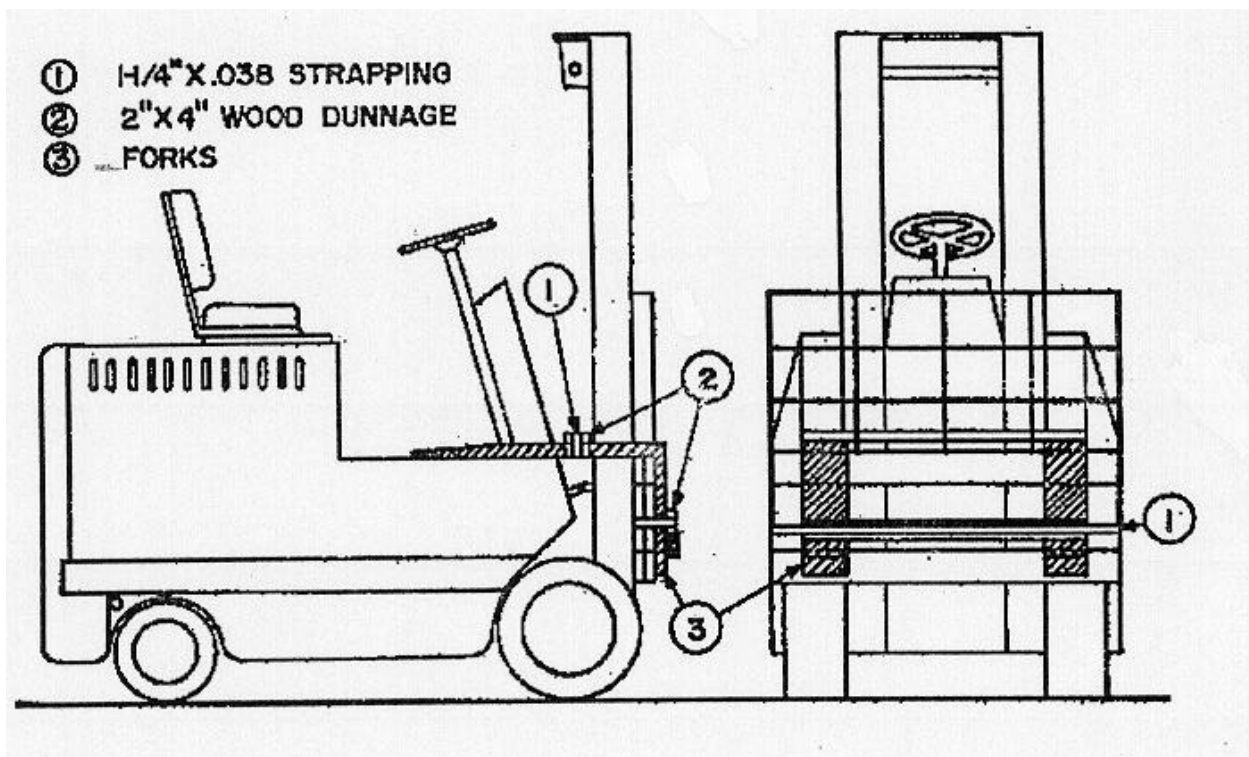


FIGURE 1. TYPICAL APPLICATION OF METAL STRAPPING SECURING FORKS TO TRUCK.

X-2278

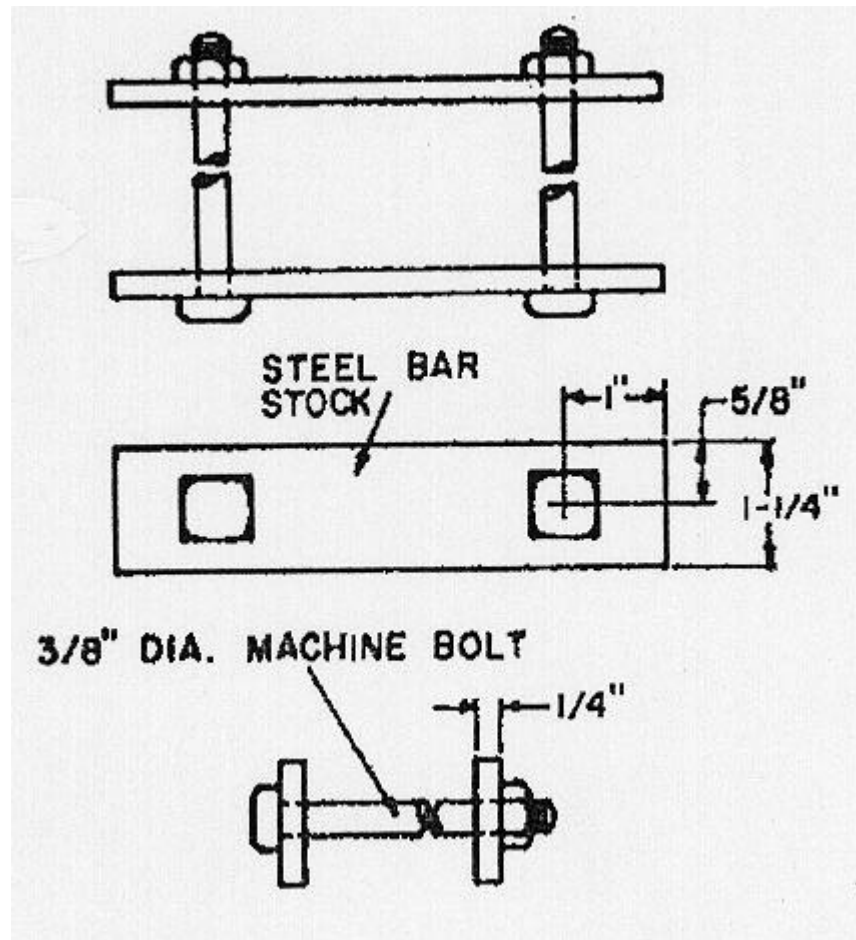


FIGURE 2. CLAMPING DEVICE USED FOR FORK SECUREMENT ON M.H.E.

X-2279

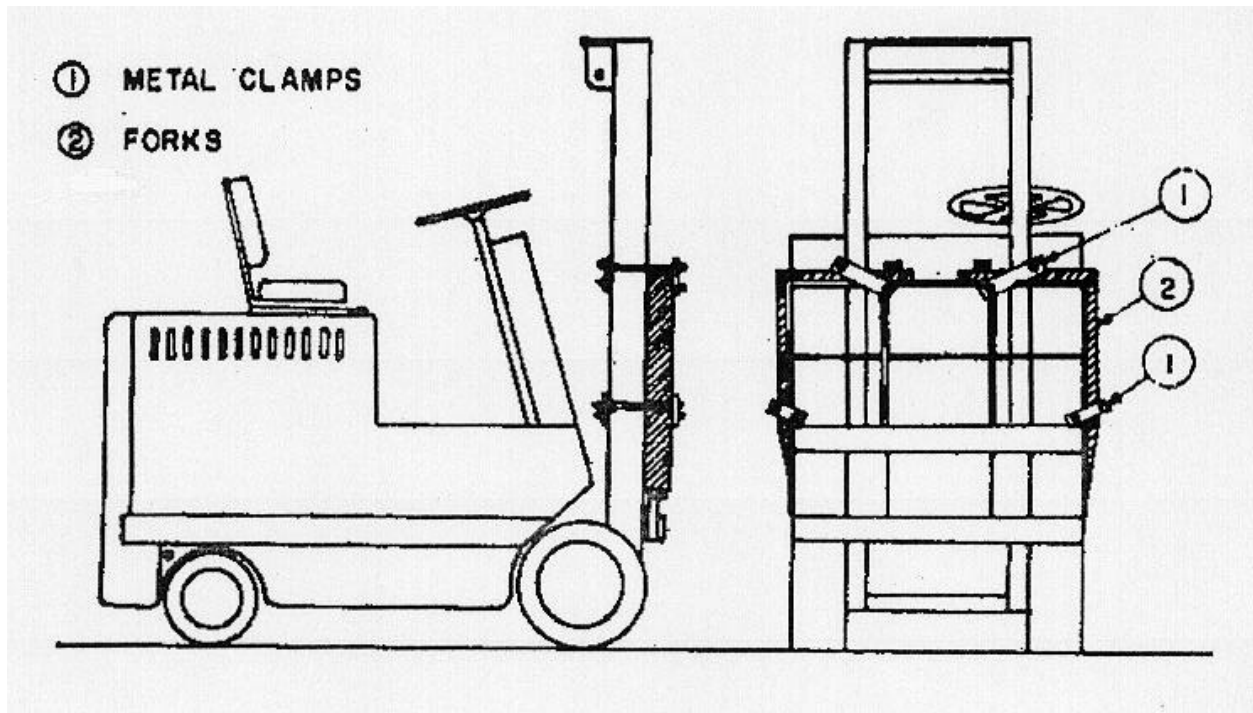


FIGURE 3. TYPICAL APPLICATION OF METAL CLAMPS SECURING FORKS TO TRUCK.

X-2280

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER

MIL-STD-162E

2. DOCUMENT DATE (YYMMDD)

800529

3. DOCUMENT TITLE MATERIALS HANDLING EQUIPMENT: PREPARATION FOR SHIPMENT, STORAGE, CYCLIC MAINTENANCE ROUTINE TESTING AND PROCESSING

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)

b. ORGANIZATION

c. ADDRESS (Include Zip Code)

d. TELEPHONE (Include Area Code)

(1) Commercial
(2) AUTOVON
(If applicable)

7. DATE SUBMITTED
(YYMMDD)

8. PREPARING ACTIVITY

a. NAME

b. TELEPHONE (Include Area Code)

(1) Commercial (810) 574-8745
(2) AUTOVON 786-8745

c. ADDRESS (Include Zip Code)

Commander
U.S. Army Tank-automotive and Armaments Command
ATTN: AMSTA-TR-E/BLUE
Warren, MI 48397-5000

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403
Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340